M&S Leadership Summit

Technology

M&S technology is powerful, pervasive, and cost-effective… and deserves systematic investment

Lt Col Emily Andrew

US Joint Forces Command

Bill Waite
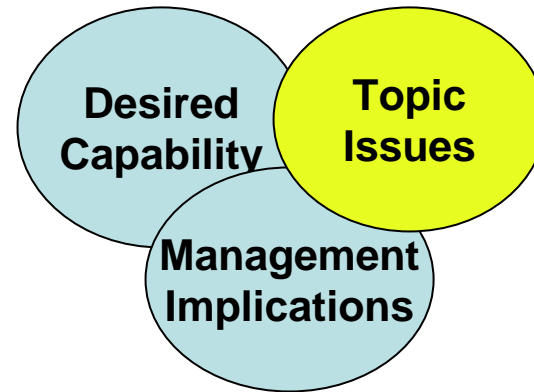
The AEgis Technologies Group

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Status of Issues from 2006 Summit

Top Issues	Recommendation	Status
Technology Advocacy	1. Develop language to implement M&S as a critical technology coordinated with Senate Tech Committee through Office of Science & Technology Policy 2. Establish national advocacy organization and process coordinated with Congressional Caucus, consistent with technical investment relevant to diverse Government Departmental missions	1. Overture to chief executive made. No contact with Senate. 2. Effort within DoD,… No congressional or national-scope organization or coordination support
Technology Foundations	1. Facilitate Identification of advanced research topics 2. Focus funding for advanced M&S research and education	1.Ongoing *SimSummit* effort on " Research Agenda" … no congressional involvement 2.no coordinated research campaign … education programs emerging
Interoperability	1. Provide market-based incentives to adopt open "voluntary consensus standards" 2. Facilitate establishment of suitable Infrastructure and available market mechanisms for standards employment	1. Continued effort by SISO… no congressional activity 2. No effective effort

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Context of Technical Environment

- Relationships among
  - Technical capability
  - Technical topic issues
  - Technology advocacy, investment and promulgation

CAPABILITY	TOPICAL ISSUES	MANAGEMENT
Affordability	Research Agenda	Technical Advocacy
Interoperability	Conceptual Modeling	Technology Investment
Reuse	System Architecture	Business Practice
Composability	Standards	
Security	Data	

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Research Agenda

- **IDENTIFICATION –** Established consensus on M&S technology research agenda
- **CIRCUMSTANCES –** No 'strategic' consensus exists. Modest effort begun to educe agreement (e.g. SimSummit 'body-of-knowledge' and 'research agenda' initiatives)
- **ISSUE / OPPORTUNITY –**
  - Lack of focus (disjoint) on technology development
  - M&S 'core' technology un-appreciated
  - *Ad hoc* technology investments … Duplicative capabilities produced … Squandered resources and time
  - Unacceptable time to 'field' critical technologies
- **PROPOSED ACTIONS –**
  - March 07, Assign Topic Issue Lead
  - April 07, Develop Proposal for Investment
  - August 07, Obtain Congressional Approval for 'Seed' Funding
  - February 08, Produce Draft National M&S Research Agenda

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Conceptual Modeling

- **IDENTIFICATION –** Established specification to measure degree of M&S technology realism and adequacy
- **CIRCUMSTANCES –** No common practice exists
- **ISSUE / OPPORTUNITY –**
    - No best-practice in establishing representation consistency and quality… Therefore, lost opportunity for re-use, interoperability, composability
    - No golden standard to explicitly determine suitability of M&S representation (i.e., verification)…Therefore difficult to measure adequacy of M&S technology to realistically replicate the world (i.e., validation)
    - Wasted time and resources in producing 'referents' representations over and over again for individual use… and lost investments in using inadequate M&S representations
- **PROPOSED ACTIONS –**
    - March 07, Assign Topic Issue Lead
    - April 07, Build Proposal for Investment
    - August 07, Obtain Congressional Approval for 'Seed' Funding
    - February 08, Demonstrate utility of best-practice guidance

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Simulation System Architecture

- **<u>IDENTIFICATION –</u>** Systematic M&S Architecture specification and implementation
- **<u>CIRCUMSTANCES</u>**
  – No regularity of practice for Simulation system architectural design and specification
- **<u>ISSUE / OPPORTUNITY –</u>**
  – In articulate / unsystematic architecture management influences simulation 'composability', 'interoperability and 're-use and un cost-effective business practices
    - Non interoperable 'stovepiped' M&S assets
    - Difficult to understand how M&S assets relate
    - Wasted resources and time to integrate M&S assets
    - Difficult to reuse M&S assets (models, simulation code, data, tools)
  – Requirements management for M&S development activity can and should 'inherit' best practice from systems engineering
- **<u>PROPOSED ACTIONS –</u>**
  – February 07, Initiate Integrating Architecture Study (1.5 years)
  – March 07, Assign Topic Issue Lead
  – August 07, Obtain Congressional Approval for 'Seed' Funding
  – February 08, Report on Best Practice for Simulation Architecture Specification and Design

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User Needs and Simulation Requirements Management

- **IDENTIFICATION –** M&S 'User Needs' and 'Requirements' Management
- **CIRCUMSTANCES –**
  - User needs vary considerably… M&S technical requirements vary much less
  - Lack of professional and coordinated needs and requirements management leads to redundant investment
  - Requirements management for M&S development activity can and should 'inherit' best practice from systems engineering
- **PROPOSED ACTIONS –**
  - Support systematic M&S requirements management across US Executive Departments

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Standards

- **IDENTIFICATION –** Established consensus on M&S standards
- **CIRCUMSTANCES –** No accepted set of standards for M&S
- **ISSUE / OPPORTUNITY –**
  - Technical standards strongly influence cost effective investment in M&S assets and subsequent use
    - Influences, composability, interoperability, re-use, data management, and asset performance
  - Existing standards processes and standards artifacts are not sufficient for emerging industry and distributed collaborative environment
  - Standards must be integral to business practice to succeed
- **PROPOSED ACTIONS –**
  - March 07, Assign Topic Issue Lead
  - April 07, Build Proposal for Investment
  - August 07, Obtain Congressional Approval for 'Seed' Funding
  - February 08, Establish consensus strategy for M&S standards evolution

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Data

- **<u>IDENTIFICATION –</u>** Established consensus on M&S data
- **<u>CIRCUMSTANCES –</u>** No common repository/tool for data
- **<u>ISSUE / OPPORTUNITY –</u>**
  - Each producer of M&S technology must produce their own data to operate simulations
  - Data produced is not standardized resulting in difficulty to share data
  - Data is not authoritative resulting in lack of confidence of data accuracy
  - Data is not shared resulting in each user of M&S technology to produce same data over and over again
  - Data takes too long to produce to the required fidelity
- **<u>PROPOSED ACTIONS –</u>**
  - March 07, Assign Topic Issue Lead
  - April 07, Assess Joint Rapid Scenario Generation (JRSG) Capability
  - February 08, Demo JRSG Utility to Support National M&S Data Need

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Technology *Out Brief*

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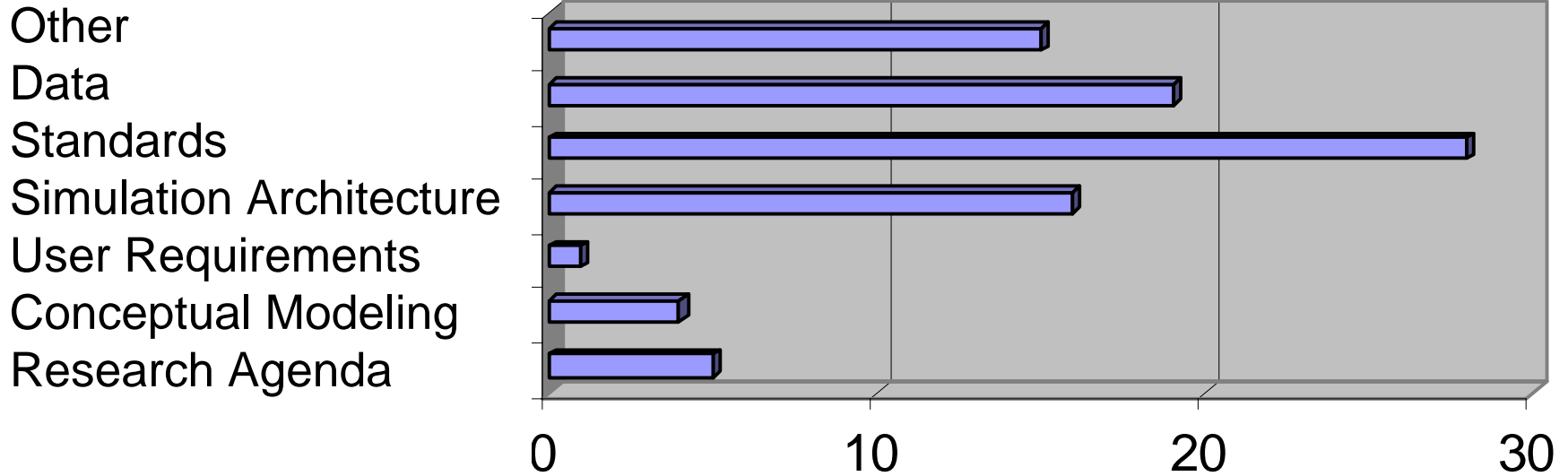and deserves systematic investment**

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Comments and Qualifications

- Research Agenda - Establish candidates, invest differentially
- Conceptual Modeling – under-appreciated
- Requirements – not evocative
- Simulation Architectures – (open) architectural regularity desired
- Standards – Standards desired… generation and control split
- Data – Registry, repository / custody? Credibility, qualification and access

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Other

- Mostly DoD mindset – modest extension to broader context

- Either we got the topics right, or it was hard to get out the box

- "Its not the technology, it's the enterprise" (market, management, etc.)

- Not all technology issues admit to ready congressional action

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TECHNOLOGY

Top Issues of 2007	"New" Actionable Recommendations
Standards	• Identify/promulgate mechanisms to promote common standards • Survey existing forums to identify 'best of breed'
Architecture	• Define an open architecture • Implement a Grand Challenge prototype • Assess DoD 1.5 year findings
Data	• Facilitate access to data sources • Assess JRSG effort to determine application